Document Title	**Assignment 02**
Course	**CS 200 Introduction to Programming**
Academic Year	**2016-2017**
Semester	**Fall**
Due Date	**October 10, 2016 11:55 pm**
Marks	**100**

The assignment is due on October 10, 2016 at 11:55 pm. The late submission policy of 15% deduction per day up to 2 days applies. This assignment will require reasonable amount of time so try to start the assignment as early as you can.

Please keep in mind the following guidelines:

- Do not share your program code with anyone.
- Do not copy code from the internet.
- If you receive any assistance, mention the part of code in which you received assistance.
- You must be able to explain any part of your submitted code.
- All submissions are subject to automated plagiarism detection.

What to submit:

You have to submit .cpp files containing source code. Zip all .cpp files into one file named as <your 8 digit roll number>.zip and submit the zip file.

Task 1 (40 marks)

Write a program to handle reservation operations for an airplane for students. Airplane has 10 rows and each row has four seats. First three rows are of business class and remaining seven rows are of economy class. A user can

i) Reserve a seat
ii) Change already reserved seat
iii) Cancel already reserved seat
iv) View seating plan
v) Seek Help

You have to make a separate function for each of the option that a user can select. Your program should display a proper error message in case of invalid input. Your program should fulfill following constraints:

i) Only one seat can be reserved against one roll number and name
ii) A user can make reservation for an available seat by entering name and roll number
iii) During the process of reservation, program asks the user to select desired class and shows the seating plan of that specific class only to reserve a seat
iv) A user can change a seat reserved against his/her name and roll number by providing roll number, name and seat number
v) A user can change seat only
    a) From economy class to business class
    b) Within business class
vi) A user can cancel an already reserved against his/her name and roll number. Name and roll number are required to cancel a seat.
vii) A user can view complete seating plan of plane. Seating plan will show reserved seat and available seats
viii) In case a user forgot his seat number, user can seek help by entering name and roll number. Your program will return the seat number reserved against entered name and roll number.
ix) If all seats are already reserved and user wants to reserve a seat, show user a message saying “Next flight will leave tomorrow”.

Seating Plan

	[Column1]	[column2]	[Column3]	[column4]
[A1]	*	o	o	*
[A2]	o	*	*	*
[A3]	*	*	*	o
[B4]	*	*	o	o
[B5]	*	o	*	*
[B6]	*	*	*	*
[B7]	*	*	o	*
[B8]	*	*	*	*
[B9]	*	*	*	*
[B10]	*	*	*	*

*= Available Seat; o= Reserved Seat

Task 2 (60 marks)

Write a program to manage Lab 3 at IST. Currently, lab 3 has 4 rows and each row has 8 computers thus having total capacity of 32 computers. You have a list of roll numbers and passwords of 10 registered students which can log in to computers in Lab 3. Your program should have two modes: **student mode** and **administrator mode**.

In student mode, a student can

1. Login to a PC by entering roll number and password
2. Sign Off from an already logged in PC by entering roll number
3. Request to Change his/her password by entering roll number
4. View Lab Seating Plan
5. View message from administrator by entering roll number

In administrator mode, an administrator can

1. View Lab's Seating Plan
2. Trace a Student
3. View change password requests
4. Change password of a student

You have to make a separate function for each of the option that a user (student/administrator) can select. Your program should display a proper error message in case of invalid input. Your program should handle following constraints:

1. Only a registered student can log in to a computer in lab.
2. A student can't log in to two computers at the same time.
3. A student can't log off from a computer on which (s)he is not logged in.
4. A student can request to change password incase (s)he has lost his/her password.
5. A student can't request to change password until (s)he has a pending password change request.
6. A student can't request for password change while (s)he is logged in to a computer.
7. A student/administrator can view seating plan of lab which shows that which computers are free and which computer are being occupied by students.
8. A student can view message form administrator only once. After reading a message from administrator, that message gets deleted.
9. Administrator can track a student i-e program will show the row number, column number and PC number on which that student is currently logged in.
10. Administrator can view 'change password requests' generated by students.
11. Administrator can change passwords of only those students who have requested for password change.
12. Administrator can change password of a student by entering roll number of a student and by entering new password for that student. New password will be sent to student by message.

Numbering Scheme of Computers in Lab

	[col1]	[col2]	[col3]	[col4]	[col5]	[col6]	[col7]	[col8]
[row 1]	1	2	3	4	5	6	7	8
[row 2]	9	10	11	12	13	14	15	16
[row 3]	17	18	19	20	21	22	23	24
[row 4]	25	26	27	28	29	30	31	32

List of roll numbers and passwords of registered students that you will be using in your program are:

Roll Number	**Password**
19100001	abc123
19100002	abc456
19100003	abc789
19100004	def123
19100005	def456
19100006	def789
19100007	xyz123
19100008	xyz456
19100009	xyz789
19100010	xyz123

It is better to make as many functions as you can to do this task. Your program should display proper error message if an invalid input is entered.